PATENT SPECIFICATION

Application Date : March 13, 1944. No. 4587/44. **572,089**
Complete Specification Left: Sept. 8, 1944.
Complete Specification Accepted: Sept. 21, 1945.

PROVISIONAL SPECIFICATION

Improvements in or relating to Sucker-Rods

I, ARCHIBALD PARK NEWALL, of British Nationality, of 109, Balmore Road, Possilpark, Glasgow, do hereby declare the nature of this invention to be as follows:—

This invention is concerned with the production of sucker rods as used in the petroleum industry, which are coupled together end to end to form a unit that may extend for a great depth into the ground, and which must necessarily possess the characteristics of great strength and accuracy, and which, owing to the nature of work they are to perform must be made as light as possible.

In practising the invention, starting with steel rod in coils of considerable weight, I draw such steel rod through dies of tungsten carbide or the equivalent to exact dimensions. I then straighten the drawn steel rod and sever it into sections each of a length of the order of 20 feet or 25 feet or other required length. The straightening operation may be effected in one stage or in two stages. The straightened rod is then rapidly hardened and tempered by electric induction heating and simultaneously quenching. After the hardening and tempering operation, I swage by a cold swaging operation the intermediate portion of the rod to a diameter less than the root diameter of the screw threads to be formed on the ends of the rod, whereby to increase the strength of the rod, and then, with or without inter-stage heat treatment, I cold roll-thread the ends of the rod by a generating process.

The rods are jointed by means of a coupling consisting of two boxes which may be of cylindrical or other shape, and a stud or stud bolt. The boxes are each bored and internally screw-threaded at one end to accommodate a rod and are each internally screw-threaded at the other end (preferably with a larger diameter thread) to take a coupling stud or stud bolt. The rod may be supplied with a box assembled on each end screwed firmly home and riveted on the inside if necessary. To complete the assembly of the rods, adjacent boxes are locked together by screwing on to the stud or stud bolt, which is located between them.

It will be understood that, as the result of swaging, the rods are considerably reduced in diameter and thus they are very much reduced in weight relatively to their length and strength, which is a matter of great importance, especially for very long rods.

As a result of the cold working combined with heat treatment there is a very large increase in the resistance to fatigue and there is also realised the advantage of a very fine surface finish.

Dated this 10th day of March, 1944.

CRUIKSHANK & FAIRWEATHER,
29, St. Vincent Place, Glasgow, and
29, Southampton Buildings,
London, W.C.2.
Agents for the Applicant.

COMPLETE SPECIFICATION

Improvements in or relating to Sucker-Rods

I, ARCHIBALD PARK NEWALL, of British Nationality, of 109, Balmore Road, Possilpark, Glasgow, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention is concerned with sucker rods as used in the petroleum industry, comprising a plurality of sections which are coupled together end to end to form a unit that may extend for a great depth into the ground, and which must necessarily possess the characteristics of great strength and accuracy, and which, owing to the nature of work they are to perform, must be made as light as possible.

The invention consists of a sucker rod of hardened and tempered steel comprising a plurality of sections each having an intermediate portion cold swaged to a reduced diameter and end portions provided

with cold rolled screw threads, and coupling boxes internally screw-threaded for engagement with said end portions and additionally formed with internal screw threads coaxial with said sections for engagement by a stud bolt common to two adjoined boxes.

In practice, starting with steel rod in a coil of considerable weight, I draw such steel rod through dies of tungsten carbide or the equivalent to exact dimensions. I then straighten the drawn steel rod and sever it into sections each of a length of the order of 20 feet or 25 feet or other required length. The straightening operation may be effected in one stage or in two stages. I then rapidly harden and temper the straightened section by electric induction heating and concomitant quenching. After the hardening and tempering operation, I swage by a cold swaging operation the intermediate portion of the section to a diameter less than the root diameter of the screw threads to be formed on the end portions of the section, whereby to increase the strength of the section, and then, with or without inter-stage heat treatment, I cold roll-thread the end portions of the suction by a generating process.

Sections so formed are jointed by means of couplings each consisting of two boxes, which may be of cylindrical or other form, and a stud or stud bolt. The boxes are each bored and screw-threaded internally at one end to accommodate a section and are each internally screw-threaded at the other end (preferably with a larger diameter thread) to take a coupling stud or stud bolt. A section may be supplied with a box assembled on each end, screwed firmly home and riveted on the inside if necessary. To complete the assembly of the sections, adjacent boxes are locked together by screwing on to the stud or stud bolt, which is located between them. The boxes may be formed with flats for engagement by a wrench.

It will be understood that, as the result of swaging, the rods are considerably reduced in diameter and thus they are very much reduced in weight relatively to their length and strength, which is a matter of great importance, especially for very long rods.

As a result of the cold working combined with the described heat treatment there is a very large increase in the resistance to fatigue and there is also realised the advantage of a very fine surface finish.

The figure of the accompanying drawing is a part elevation part section of two adjoined sucker rod sections.

In the figure, 1 denotes the intermediate part of each sucker rod sections reduced in diameter by cold swaging after the hardening and tempering treatment as described, the end portions of the sections having thereafter been provided with screw-threads as at 2 by a cold-rolling finishing process. The screw-threaded end portions engage conformably internally screw-threaded boxes 3, the extreme ends of the sections being riveted over as at 2^a. Each box 3 is additionally internally threaded as at 4 to accommodate a stud bolt 5 aligned with the sections, the threads of the stud bolt being preferably tapered as shown at 6 to form tight joints.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:—

1. A sucker rod of hardened and tempered steel comprising a plurality of sections each having an intermediate portion cold swaged to reduced diameter and end portions provided with cold rolled screw threads, and coupling boxes internally screw-threaded for engagement with said end portions and additionally formed with internal screw threads co-axial with said sections for engagement by a stud bolt common to two adjoined boxes.

2. A sucker rod section constructed as described with reference to the accompanying drawing.

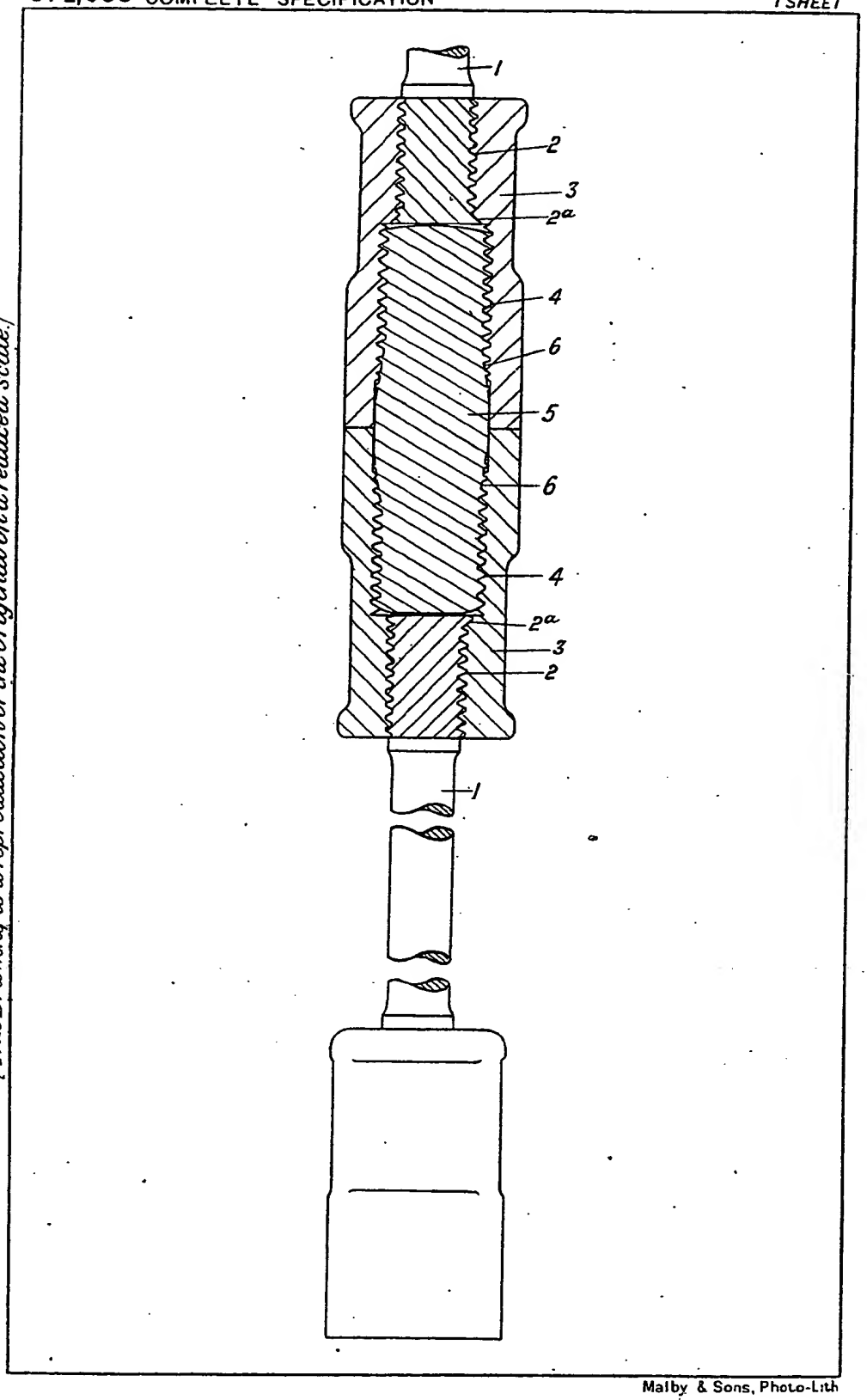
Dated this 7th day of September, 1944.

CRUIKSHANK & FAIRWEATHER,
29, St. Vincent Place, Glasgow, and
29, Southampton Buildings,
London, W.C.2,
Agents for the Applicant.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1945.

572,089 COMPLETE SPECIFICATION

1 SHEET



[This Drawing is a reproduction of the Original on a reduced scale.]

Malby & Sons, Photo-Lith